‘Plastic’ yeast strains from Belgium & Germany: Learning to compromise

Stan Hieronymus – NHC 6.19.2010

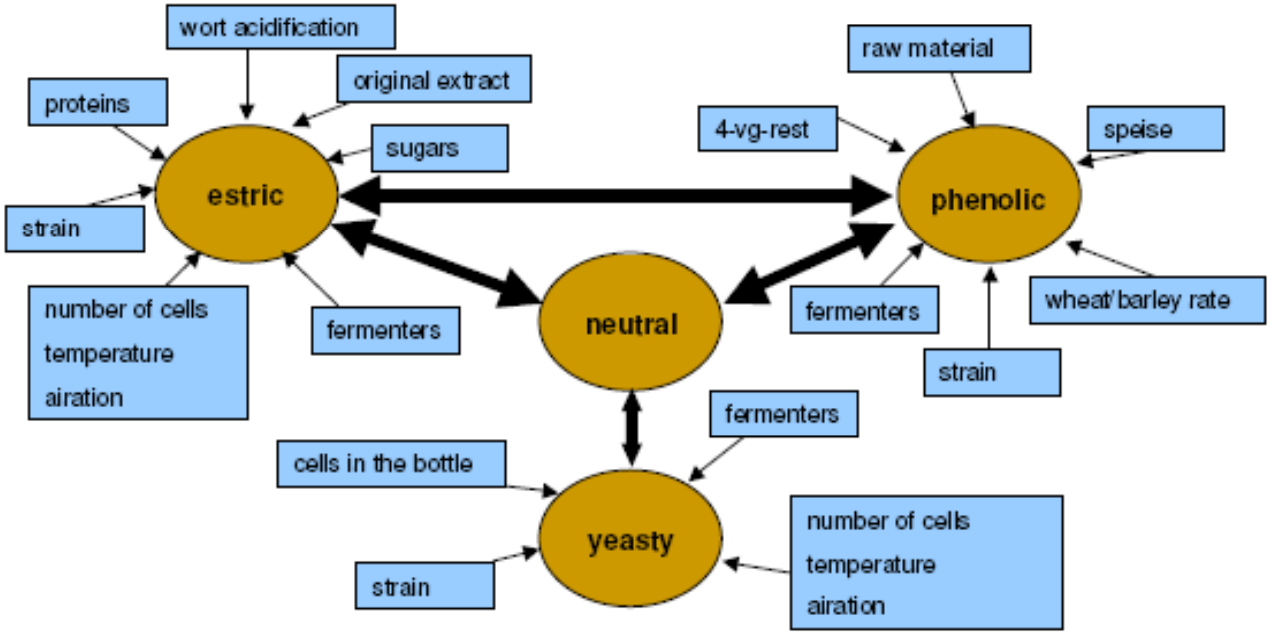
“These are very plastic yeasts. There are some yeasts, like Chico (the American ale yeast from Sierra Nevada Brewing), that you make a change in temperature or pitching rates and the beer still comes out the same. With (*weizen*) yeasts, you change anything just a little, and you get a different profile.”

- Dave Bryant, Brewing-Science Institute

“Brewing is a compromise. You have to take into account so many factors. You can’t look at the temperature as a sole factor. It’s an interaction. You need to see any beer you create as a holistic thing.”

- Peter Bouckaert, New Belgium Brewing

ESSENTIAL FACTORS FOR FLAVOR FORMATION



Changing the geometry at Orval

	Acetaldehyde	Ethyl Acetate	Isoamyl Alcohol	Ethyl Caproate	Ethly Caprylate	Isoamyl Acetate
Threshold	25	33	70	0.23	0.9	1.6
Open (mean)	7.3	35.17	146.43	0.29	0.38	5.18
CCT (mean)	7.15	39.32	160.69	0.28	0.32	5.03
	Green apple Fruity	Solvent Fruity Sweetish	Alcohol Banana Sweetish	Apple Fruity Aniseed	Apple Fruity Sweetish	Banana Apple Solvent

“When you change something, you have to know what you do. You have to know how to produce beer, to have some idea of the technology, and to taste and taste again and again.”

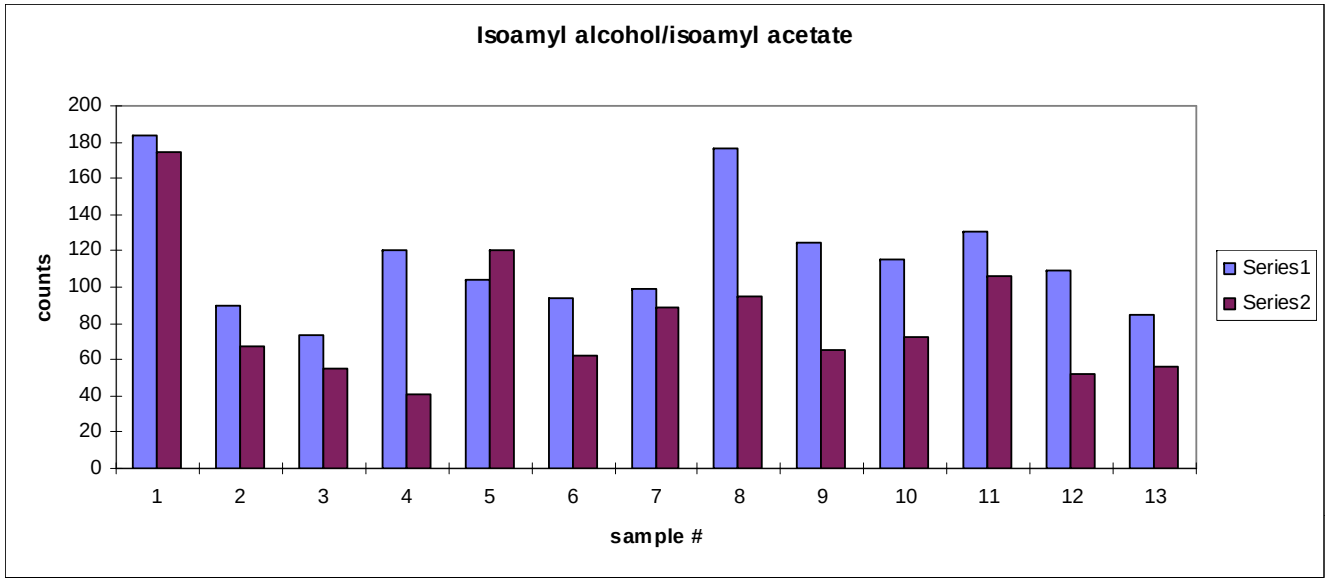
- Jean-Marie Rock, Orval

Wheat Beer Flavor Study

David Logsdon-Wyeast Laboratories, David Bryant-BSI, Larry Nielsen-Microanalytics

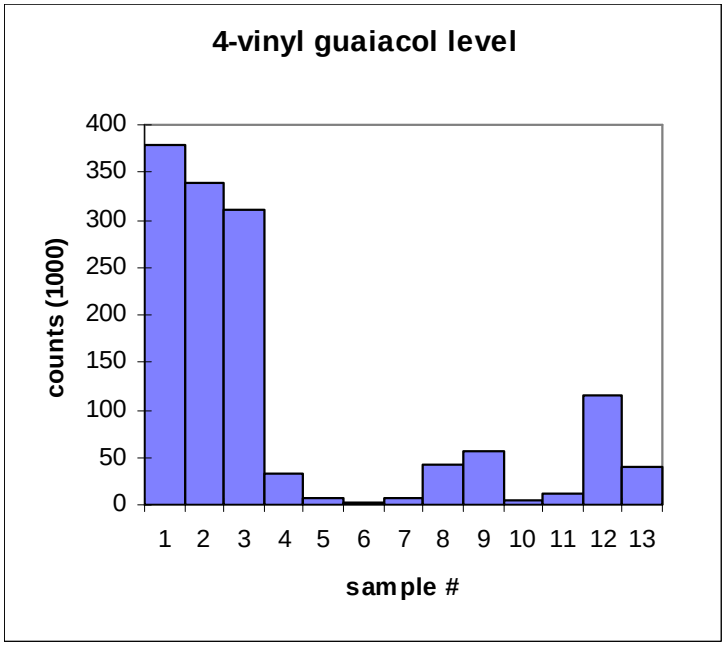
Grain bill – 10.58 – 14 IBU
Two row pale 50%
Malted wheat 21%
Unmalted wheat 21%
Munich 10L 6%
Crystal 60L 2%

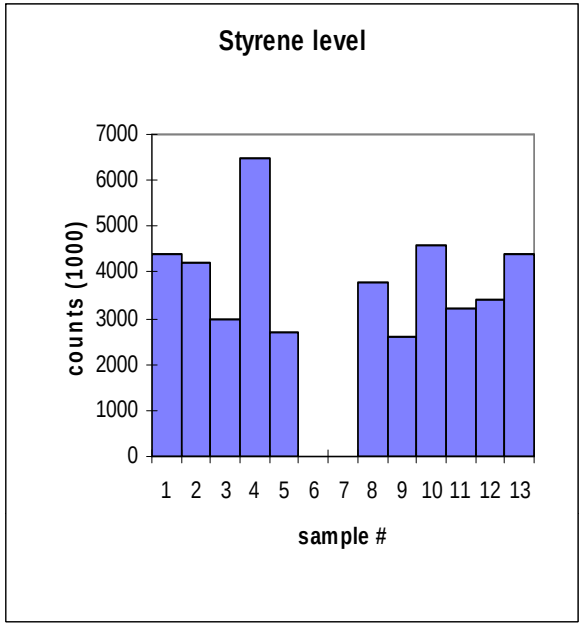
Mash schedule
122º 30 minutes
144º 30 minutes
152º 30 minutes
155º 20 minutes
170º mashout



#	yeast type	isoamyl acetate normalized	GC-O value	Isoamyl alcohol normalized	GC-O value	flavor panel
1	Belgian Ale Yeast	87.4	1537	184	712	strong banana
2	Trappist High Gravity	33.5	1413	90	682	
3	Belgian Ardennes Yeast	27.3	1102	73	1054	banana
4	German Wheat Yeast	20.4	846	120	1515	banana
5	Weihenstephen Weizen Yeast	60.3	1946	104	1293	strong banana
6	American Wheat	31.1	1584	94	1896	
7	Belgian Abbey Yeast II	44.3	2197	99	1856	
8	Forbidden Fruit Yeast	47.2	694	177	1153	
9	Belgian Wheat Yeast	32.9	527	124	664	banana
10	Belgian Whitbier Yeast	36.2	1062	115	591	
11	Bavarian Wheat Yeast	52.9	1213	131	1563	strong banana
12	Canadian/Belgian Style Yeast	26.2	998	109	1198	
13	Leuven Pale Ale Yeast	27.9	835	85	449	banana

#	yeast type	4-vinyl guaiacol	GC-O value: 4-vinyl guaiacol	4-vinyl phenol	flavor panel: selected aromas from overall beer evaluation
1	Belgian Ale Yeast	380	4780	46.0	clove, spicey
2	Trappist High Gravity	340	2955	75.0	spicy
3	Belgian Ardennes Yeast	310	5216	no value	clove, spicey
4	German Wheat Yeast	34	419	2.9	clove, spicey
5	Weihenstephen Weizen Yeast	7.5	973	<	clove
6	American Wheat	2.7	0	0.2	none
7	Belgian Abbey Yeast II	6.0	0	0.6	none
8	Forbidden Fruit Yeast	42	1016	0.4	clove, spicey
9	Belgian Wheat Yeast	56	838	1.2	spicy
10	Belgian Whitbier Yeast	5.5	0	<	spicy
11	Bavarian Wheat Yeast	12.5	571	0.3	spicy
12	Canadian/Belgian Style Yeast	115	830	2.0	clove, spicey
13	Leuven Pale Ale Yeast	40	1030	3.5	clove, spicey





#	yeast type	styrene (thousands of counts of ion 104)	GC-O value	flavor panel (selected odors)
1	Belgian Ale Yeast	4400	1631	
2	Trappist High Gravity	4200	323	
3	Belgian Ardennes Yeast	3000	1105	burnt, oxidized
4	German Wheat Yeast	6500	1722	resiny, oxidized
5	Weihenstephen Weizen Yeast	2700	1269	burnt, smokey
6	American Wheat	22	0	
7	Belgian Abbey Yeast II	18	0	
8	Forbidden Fruit Yeast	3800	613	olive-like, smokey, phenolic
9	Belgian Wheat Yeast	2600	337	resiny, olive-like, smokey
10	Belgian Whitbier Yeast	4600	3054	phenolic
11	Bavarian Wheat Yeast	3200	1069	resiny
12	Canadian/Belgian Style Yeast	3400	1940	oxidized
13	Leuven Pale Ale Yeast	4400	1557	plastic, styrene, oxidized

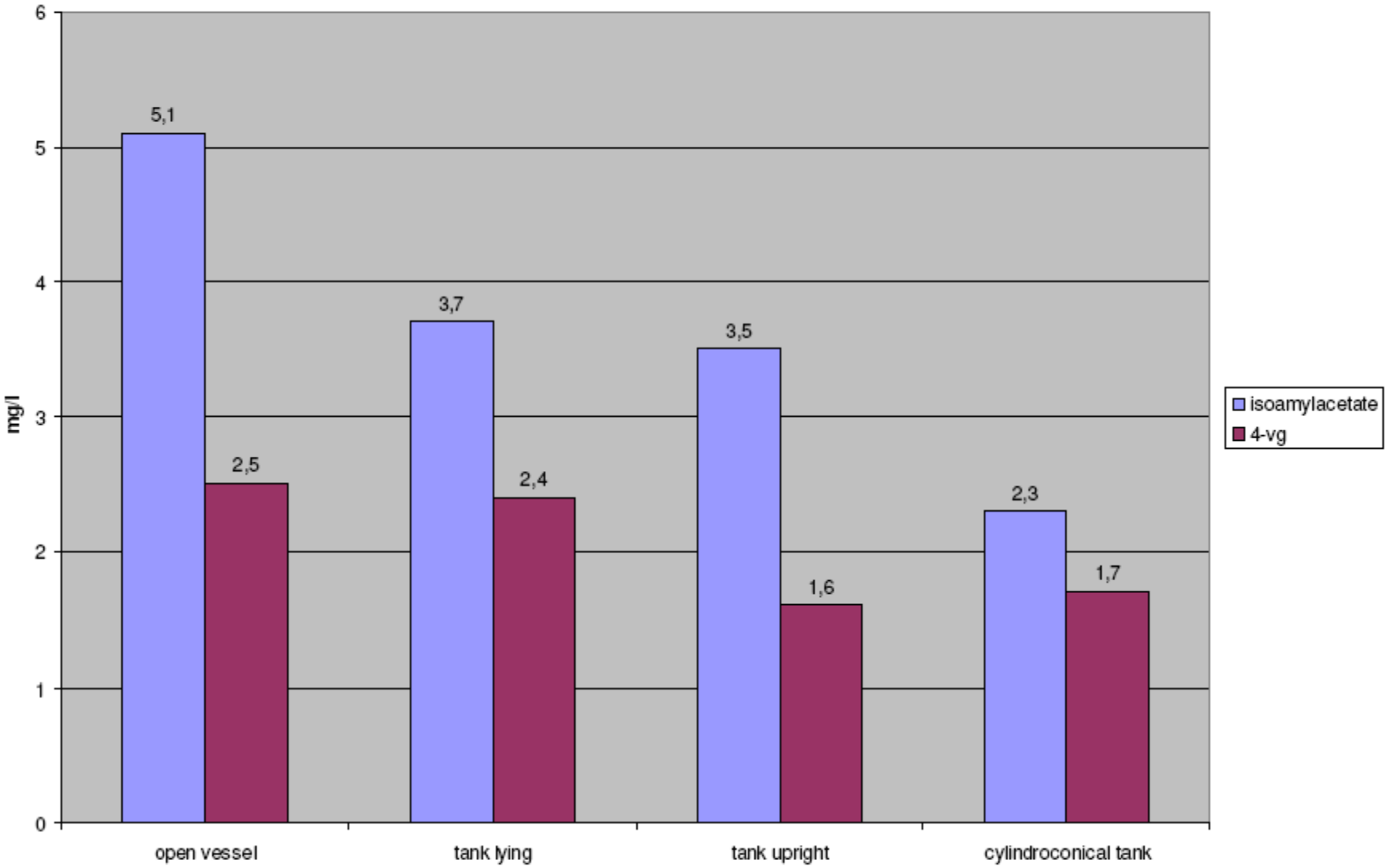
Same yeast – 3 approaches

Achel Bruin
Yeast is pitched at 63 to 64 °F (17 to 18 °C)
Top temperature 72 to 73 °F (22 to 23 °C)
Fermentation in cylindro-conical tanks.

Westmalle Dubbel
Yeast is pitched at 64 °F (18 °C)
Top temperature 68 °F (20 °C)
Fermentation in closed squares

Westvleteren 8
Yeast is pitched at 68 °F (20 °C)
Top temperature 82 to 84 °F (28 to 29 °C)
Open fermentation

4-vg rest and intensity of flavor notes			
Time	0 minutes	10 minutes	> 25 minutes
Phenolic	1.2	2.1	3.3
Fruity-estric	4.1	3.4	2.6
Yeasty	1.8	2.6	2.8


6
5
4
3
2
1
0
mg/l
5,1
2,5
3,7
2,4
3,5
1,6
2,3
1,7
open vessel
tank lying
tank upright
cylindroconical tank
isoamylacetate
4-vg

Sample beers

OG: 1.048 12 ºP
BU: 10 (Celeia, Slovenian hop with noble characteristics)

Beer 1 - 50% wheat malt, 50% pilsner, single infusion mash, 60 min @ 149º F. Fermented at 62º F with Wyeast 3787.

Beer 2 - 20% unmalted wheat, 80% pilsner, step infusion 15 min feculic acid rest @ 113º F, 60 min @ 149º F, fermented at 62º F with Wyeast 3068. Tanal A.

Beer 3 - grist same as beer #1, Schneider decoction with ferulic dough in (113º F x 12 min), fermented at 62º F with Wyeast 3068.

Beer 4 - Pilsner malt, 5% oats. Step infusion with 15 min ferulic acid rest @ 113º F, 60 min @ 149º F, fermented at 62 ºF with Wyeast 3944. Tanal A.

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